

GS393 Series

Low Power Low Offset Voltage Dual Comparators

Product Description

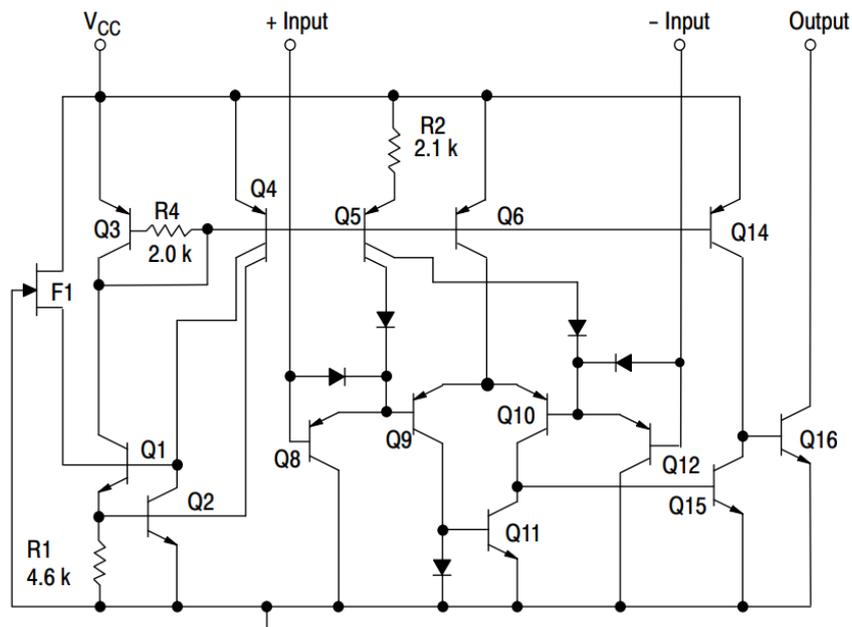
The GS393 consists of two independent precision voltage comparators which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

The GS393 was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, the GS393 will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.

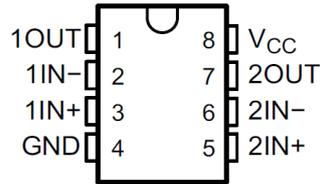
Features

- Wide supply Voltage range: 2.0V to 36V.
- Low supply current drain independent of supply voltage.
- Low input biasing current: 25 nA typ.
- Low input offset current: 5 nA typ.
- Low input offset voltage: 2 mV typ.
- Input common-mode voltage range includes GND.
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage.
- Output voltage compatible with TTL, MOS and CMOS logic.

Block Diagram



Packages & Pin Assignments

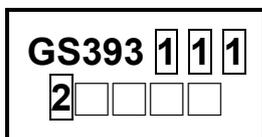


Pin	Pin Name	I/O	Description
1	1OUT	Output	Output pin of comparator 1
2	1IN-	Input	Negative input pin of comparator 1
3	1IN+	Input	Positive input pin of comparator 1
4	GND	—	Ground
5	2IN+	Input	Positive input pin of comparator 2
6	2IN-	Input	Negative input pin of comparator 2
7	2OUT	Output	Output pin of comparator 2
8	Vcc	—	Positive Supply

Ordering and Marking Information

Ordering Information			
Part Number	Package	Marking Code	Quantity/Reel
GS393SF	SOP-8L	GS393S F□□□□	4,000 PCS
GS393MSF	MSOP-8L	GS393MS F□□□□	4,000 PCS
GS393TSSF	TSSOP-8L	GS393TSS F□□□□	5,000 PCS

Marking Information



Product Code:
GS393

Package Code:
 1 is S, MS and TSS
 - **S** is SOP-8L
 - **MS** is MSOP-8L
 - **TSS** is TSSOP-8L

Green Level:
 2 is F stands for RoHS Compliant and Halogen Free

GS Code:
 □ is GS Code.

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit	
V _{CC}	Supply Voltage	36	V	
V _{IDR}	Differential Input Voltage	36	V	
V _{IN}	Input Voltage	-0.3 to +36	V	
I _{OS}	Output Short-Circuit to GND	Continuous		
P _D	SOP-8L	625	mW	
	MSOP-8L	500		
	TSSOP-8L	470		
R _{θJA}	Junction to Ambient Thermal Resistance	SOP-8L	160	°C/W
		MSOP-8L	200	
		TSSOP-8L	210	
T _A	Operating Temperature Range	-40 to 85	°C	
T _{STG}	Storage temperature Range	-65 to 150	°C	
ESD	ESD Rating (HBM)	2K	V	

Note 1: For operating at high temperatures, the GS393 must be derated based on a 125°C maximum junction temperature and a thermal resistance of 170°C /W which applies for the device soldered in a PCB, operating in a still air ambient. The low bias dissipation and the “ON-OFF” characteristic of the outputs keeps the chip dissipation very small ($P_D \leq 100\text{mW}$), provided the output transistors are allowed to saturate.

Electrical Characteristics

at specified free-air temperature, $V_{CC}=5V$ (Unless Otherwise Noted)

Symbol	Parameter	*Test conditions	Min	Typ	Max	Unit
V_{IO}	Input offset voltage	$T_A = 25^\circ C$		2	5	mV
		$0^\circ C \leq T_A \leq 70^\circ C$			9	
I_{IO}	Input offset current	$T_A = 25^\circ C$		5	50	nA
		$0^\circ C \leq T_A \leq 70^\circ C$			150	
I_{IB}	Input bias current	$T_A = 25^\circ C$		-25	-250	nA
		$0^\circ C \leq T_A \leq 70^\circ C$			-400	
V_{ICR}	Common-mode input voltage range	$T_A = 25^\circ C$	0		$V_{CC} - 1.5$	V
		$0^\circ C \leq T_A \leq 70^\circ C$	0		$V_{CC} - 2.0$	
G_V	Large-signal differential voltage amplification	$V_{CC} = 15V$, $R_L \geq 15k\Omega$ to V_{CC}	50	200		V/mV
I_{OH}	High-level output current	$V_{IN(+)} \geq 1.0V$, $V_{IN(-)} = 0V$, $V_O = 5.0V$		0.1	50	nA
		$V_{IN(+)} \geq 1.0V$, $V_{IN(-)} = 0V$, $V_O = 30V$			1	μA
V_{OL}	Low-level output voltage	$V_{IN(-)} \geq 1.0V$, $V_{IN(+)} = 0V$, $I_{SINK} \leq 4.0mA$		130	400	mV
		$V_{IN(-)} \geq 1.0V$, $V_{IN(+)} = 0V$, $I_{SINK} \leq 4.0mA$, $0^\circ C \leq T_A \leq 70^\circ C$			700	
I_{SINK}	Low-level output current	$V_{OL} = 1.5V$, $V_{ID} = 1V$	6	16		mA
I_{CC}	Supply current	$R_L = \infty$		0.4	1	mA
		$V_{CC} = 30V$			2.5	
V_{id}	Differential Input Voltage				V_{CC}^+	V

Switching Characteristics ($V_{CC}=5V$, $T_A=25^\circ C$)

Symbol	Parameter	Typ	Unit
t_{re}	Response time $V_{RL} = 5.0V$, $R_L = 5.1k\Omega$	1.3	μs
t_{rel}	Large Signal Response Time $V_{IN} = TTL$, $V_{REF} = 1.4V$	0.3	

* C_L includes probe and jig capacitance.

Note 1: The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

Typical Performance Characteristics

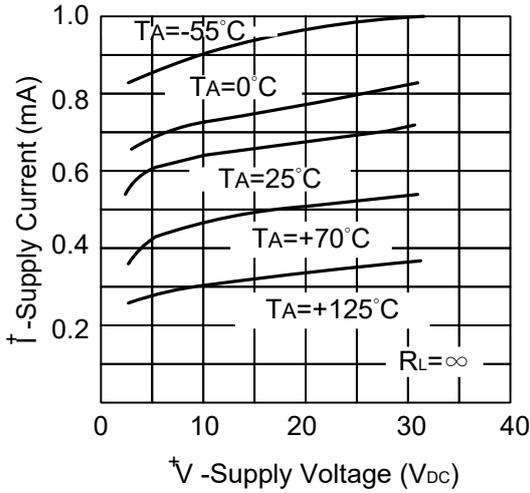


Fig.1 Supply Current

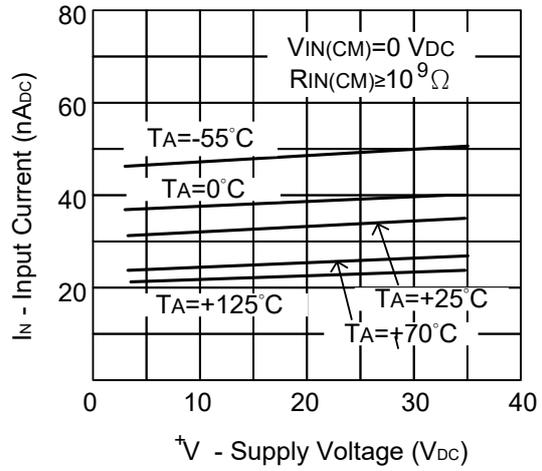


Fig.2 Input Current

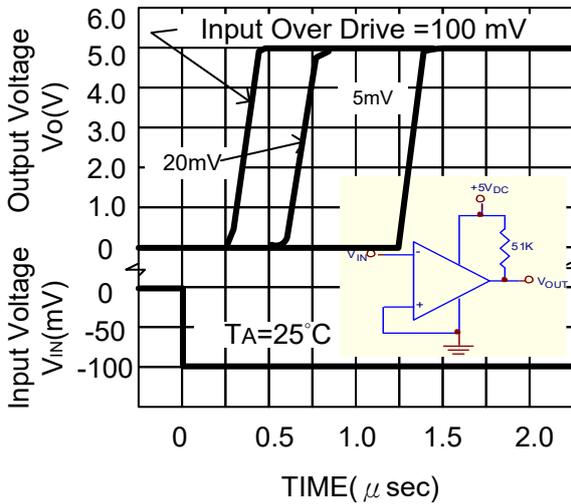


Fig.3 Response Time for Various Input Overdrives-Positive Transition

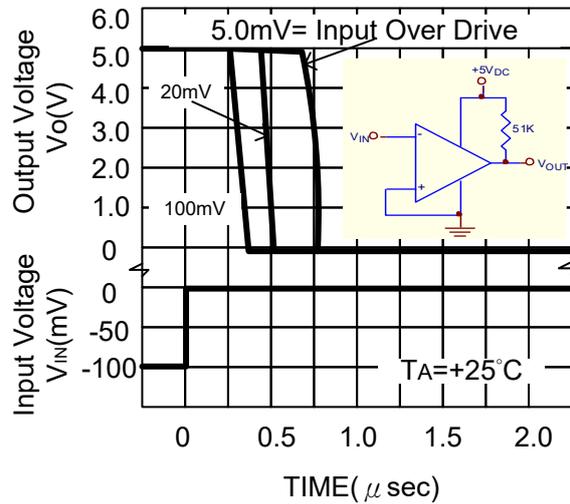


Fig.4 Response Time for Various Input Overdrives-Negative Transition

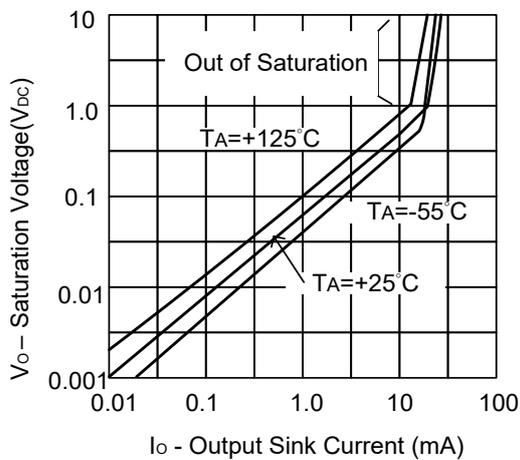
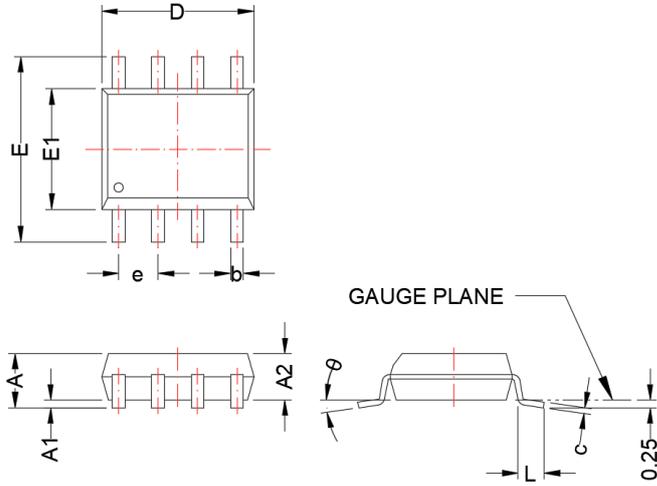


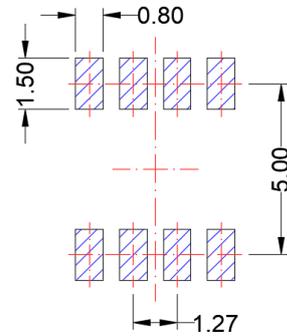
Fig.5 Output Saturation Voltage

SOP-8L

Package Dimension



Recommended Land Pattern



Unit:mm

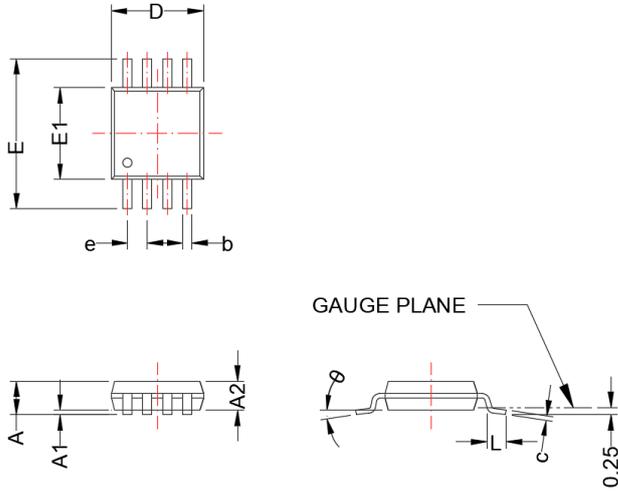
Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	---	1.75	---	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	---	0.049	---
b	0.31	0.51	0.012	0.020
c	0.10	0.25	0.004	0.010
D	4.70	5.10	0.185	0.201
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

NOTE:

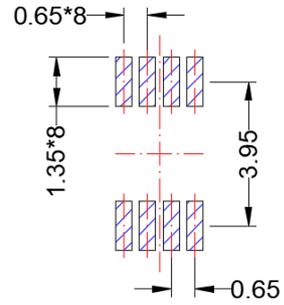
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

MSOP-8L

Package Dimension



Recommended Land Pattern



Unit:mm

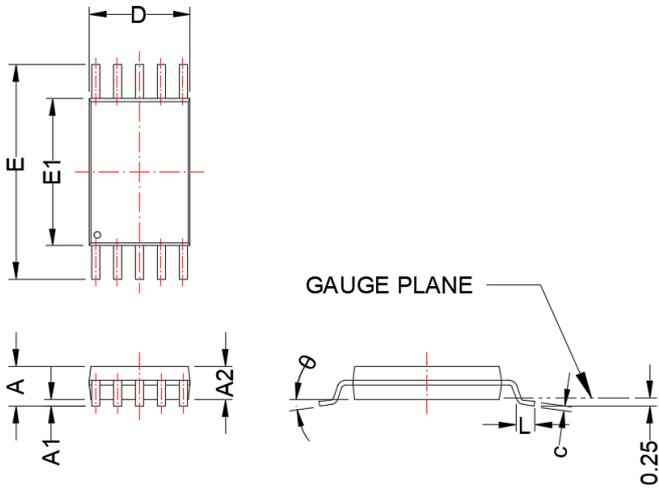
Dimensions				
Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	---	1.10	---	0.043
A1	0.00	0.15	0.000	0.006
A2	0.75	0.95	0.030	---
b	0.22	0.38	0.009	0.015
c	0.08	0.23	0.003	0.009
D	2.90	3.10	0.114	0.122
E	4.70	5.10	0.185	0.201
E1	2.90	3.10	0.114	0.122
e	0.65 BSC		0.026 BSC	
L	0.40	0.80	0.016	0.031
θ	0°	8°	0°	8°

NOTE:

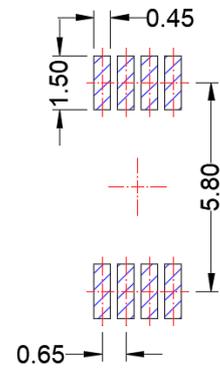
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

TSSOP-8L

Package Dimension



Recommended Land Pattern



Unit:mm

Dimensions				
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	---	1.20	---	0.047
A1	0.05	0.15	0.002	0.006
A2	0.80	1.05	0.031	0.041
b	0.17	0.30	0.007	0.012
c	0.09	0.20	0.004	0.008
D	2.90	3.10	0.114	0.122
E	6.20	6.60	0.244	0.260
E1	4.30	4.50	0.169	0.177
e	0.65 BSC		0.026 BSC	
L	0.45	0.75	0.018	0.030
theta	0°	8°	0°	8°

Note:
Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

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